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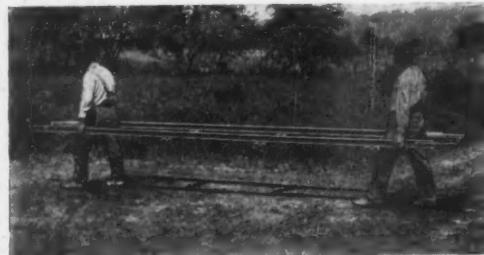
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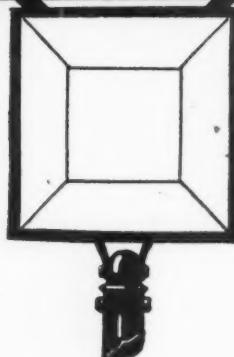
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A SIPHON RESERVOIR BLOW-OFF

For Wasting Bottom Water from Rio Grande Reservoir, Canal Zone—Bottom Water Rendered Foul by Organic Matter—Analyses Showing Improvement Resulting from Use of Siphon.

By GEO. C. BUNKER.*

The installation of a siphon was proposed by the writer in order to draw off the stagnant water on the bottom of the Rio Grande reservoir, for this had not been done during a period of about fourteen years because the original 20-inch blow-off had been buried under concrete and rock.

Fourteen-inch cast-iron and spiral-riveted steel pipe were used in the construction of the siphon, which was carried over the top of the spillway. The center of the crown is 2 feet above the top of the spillway; the upstream leg is 39 feet 9 inches long, which brings the end to within 3 feet 6 inches of the bottom of the reservoir. The down-stream leg runs down to the old bed of the Rio Grande River, a vertical distance of 35 feet 3 inches, with a gate valve on the unsubmerged end. One-inch taps are provided in the crown for filling the siphon with water from a pressure line and removing the air by a small hand-pump.

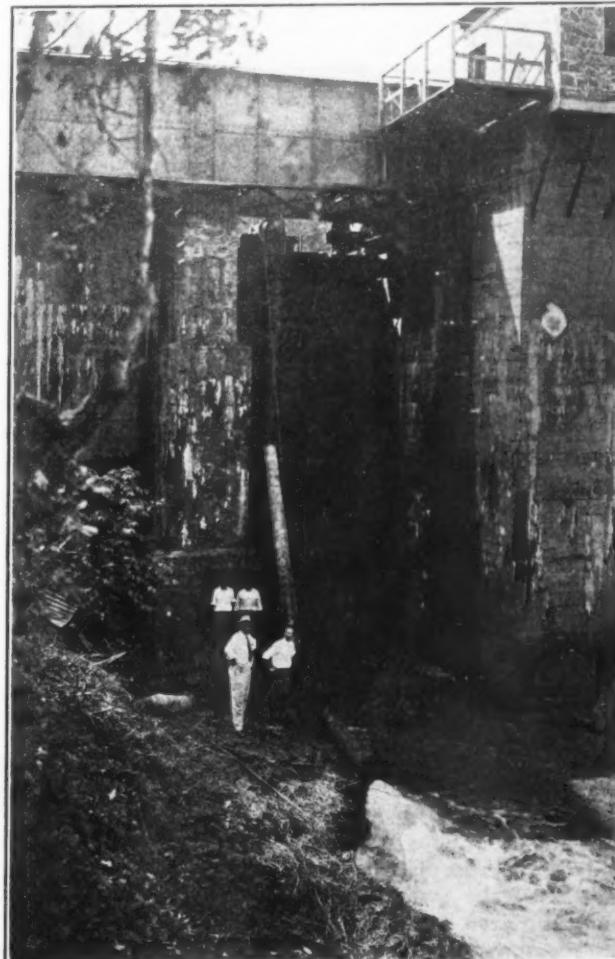
The siphon was placed in operation at 2:15 P. M., December 4, 1918, without any trouble and allowed to run with the discharge valve one-half open until 9:15 A. M., December 6. During this period of 67 hours the water was drawn down 14.5 inches below the top of the spillway, representing a volume of 25,000,000 gallons. It was not considered desirable to draw off a larger volume, as the rainy season was nearly finished. In the future the siphon will be operated during the rainy season at such times as the water starts to flow over the spillway, so that the stagnant water on the bottom of the reservoir will be wasted and the fresh water in the run-off will be saved.

This procedure is very essential in the tropics to prevent an accumulation of the disagreeable waste products of the processes of decomposition with the resultant impairment of the quality of the water.

This impounding reservoir was formed in 1888 when the French Canal Company constructed a dam across the Rio Grande River, a short distance south of Culebra, to furnish water for construction purposes. In 1904 the height of the dam was raised 17 feet by the Isthmian Canal Commission to an elevation of 235 feet above mean sea level. The capacity of the reservoir at this elevation is 400,000,000 gallons. The area of the watershed is 2,015 acres and of the water surface is 62 acres. The gate house, on the lower side of the dam and close to it, is 9 by 11 feet in plan by 50 feet deep. When built, it was provided with three 16-inch intakes, at elevations of 192, 216 and 224. In 1905 a 16-inch cast-iron main was run to a reservoir in Ancon and from this

reservoir water was supplied to Panama City for the first time on July 4, 1905. In March, 1915, the Miraflores purification plant was placed in operation with its raw water supply coming from the Chagres River, so that the reservoir was abandoned as a source of supply for the southern end of the Canal Zone.

At the present time the reservoir furnishes the water supply for Culebra. Para grass grows very abundantly along the shore line and when submerged by a rise in elevation it rapidly turns brown, thus contributing a large amount of coloring matter to the water in addition to furnishing organic matter for the putrefactive reactions in the bottom layers of the water. In June, 1917,



SIPHON AT RIO GRANDE RESERVOIR.

*In charge of Canal Zone water purification and laboratories of Municipal Engineering Division.

special fittings were caulked into the two intakes, which were located at depths of 11 and 19 feet below the surface of the water, and vertical pipes attached which were extended to within 3 feet of the maximum elevation. After these surface intakes had been placed in use, it was possible to obtain water of a quality greatly superior to that formerly drawn from the same intakes at the lower levels.

As previously mentioned, the blow-off valve had not been used for about fourteen years, with the result that a zone of foul water of considerable depth had accumulated on the bottom of the reservoir. On October 21, 1918, there was a rainfall of 4.59 inches in twenty-four hours, resulting in a flood on the water-side of the Rio Grande River, which is the largest feeder to the reservoir. The large and sudden inrush of fresh water stirred up the foul water on the bottom of the reservoir and mixed it throughout the entire volume of water in the lower end. The effect is best illustrated by giving analyses of the water passing out through the surface intakes before and after the rain:

Analyses of Water Removed Through Surface Intakes.

Date of collection	6 days before the rain.		1 day after the rain.	
	Source of sample	Parts per Million	Source of sample	Parts per Million
		10/15/18		10/22/18
		3 feet below surface		
Color—				
Total	35	225		
True	0	22		
Odor	3-e	4-e		
Turbidity	2	30		
Free carbonic acid	4.6	6.3		
Alkalinity to erythrosine	48.6	42.5		
Hardness, soap	48.1	42.4		
Iron (Fe)	0.4	2.4		
Chlorides (Cl)	3.6	3.0		
Oxygen consumed	3.1	6.2		
Oxygen dissolved	3.6	0.0		
Per cent saturation	45.0	0.0		
Nitrogen as:				
Nitrites	0.002	0.0005		
Nitrates	0.08	0.02		

On October 24th, three days after the rain, samples were collected in front of the dam at depths of 4, 21 and 42 feet below the surface to learn the difference in composition of the top, middle and bottom water:

Analyses of Water at Different Depths.

Depth below surface, feet	Parts per Million		
	4	21	42
Color—			
Total	96	295	490
True	35	59	86
Odor	4-earthy	4-musty	4-musty
		earthy	earthy
Turbidity	15	60	400
Free carbonic acid	4.0	3.0	3.4
Alkalinity to erythrosine	43.0	28.3	27.3
Hardness, soap	43.3	28.3	26.6
Iron (Fe)	1.0	3.2	10.4
Chlorides (Cl)	3.6	3.6	3.2
Oxygen consumed	5.2	11.4	18.3
Oxygen dissolved	5.0	1.1	0.3
Per cent saturation	63.2	13.3	3.6
Nitrogen as:			
Nitrites	Trace	0.002	0.005
Nitrates	0.02	0.025	0.03

It was not until December 3, 1918, that the water as drawn from 2 feet below the surface was in nearly the same condition as prior to the rain on October 21, 1918. Had the siphonic blow-off been installed before the rainy season started and the bottom water wasted instead of the run-off, the conditions represented by the analyses of the samples collected after the heavy rain would not have resulted. Following are partial analyses of the water drawn from the bottom of the reservoir by the siphon two hours after it was started, and that taken two feet below the surface through the intake:

Analyses of Water from Bottom and Surface Two Hours After Starting Siphon.

Source of sample	Parts per Million	
	Bottom	2 feet below surface
Date of collection	12/4/18	12/3/18
Color		
Total	206	37
True	35	0
Odor	4-Hydrogen sulphide	4-e
Turbidity	16	10
Free carbonic acid	12.4	...
Carbonate (CO ₃)	...	2.4
Alkalinity, erythrosine	35.5	43.6
Hardness, soap	34.9	39.9
Iron (Fe)	3.0	0.5
Chlorides (Cl)	3.3	3.4
Oxygen consumed	5.7	3.8
Oxygen dissolved	*	7.0
Per cent saturation		88.3
Nitrogen as		
Free ammonia	0.336	...
Albuminoid ammonia	0.312	...
Nitrites	None	0.0005
Nitrates	0.04	0.025
Total solids	116.0	
Fixed residue	82.0	

*Sample could not be collected.

The siphon was installed by A. S. Boyd and A. K. Evans, of Pedro Miguel, under the direction of the acting municipal engineer, R. C. Hardman.

ROCHESTER'S SEWER AND PAVING SPECIFICATIONS.

New Specifications for Pavement, Sidewalk and Sewer Construction Adopted by the Engineering Department for After-the-War Work.

By JAMES W. ROUTH.*

As a part of its preparation for after-the-war work, the Engineering Department of the city of Rochester has revised and rewritten its specifications for pavement, sewer and sidewalk construction.

For some time the need for a complete revision of specifications has been evident. The old specifications date back several years and no consistent effort was made to keep them up to date. When occasion demanded, sections were added or eliminated (seldom the latter), with the result that they became contradictory in places and were poorly arranged. Observation of work done indicated that, while in many cases the specifications were not observed, yet frequently this was true because of their inadequacy. Without doubt the same condition obtains in many cities.

Points of interest in the new specifications are outlined briefly under the several heads following:

FORM.

The specifications are being printed in loose-leaf form, the page size corresponding to that of the inspectors' notebooks. They have been divided into seven general or main divisions, dealing respectively with the contract and proposal form, general requirements applying to all construction, specifications for materials, specifications for pavement construction, specifications for sewer construction, specifications for sidewalk construction, and specifications for special and miscellaneous structures and operations.

By separating specifications governing materials from those governing operations, there is avoided the necessity for duplicating the specifications for materials in the various sections devoted to operations. Thus the possibility of conflicting specifications for materials is avoided. Furthermore, if the requirements for all classes of materials are grouped in one section, there can be no doubt

*Chief engineer, Rochester Bureau of Municipal Research.

as to where such requirements may be found or as to which requirements will govern in any case. The old specifications were found somewhat faulty in this respect.

The same arguments apply also to the separation, one from another, of the several specifications governing operations. Moreover, there is gained additional clearness from grouping together in one section all specifications relating to the particular class of work covered therein. Thus it will no longer be necessary, as has been the case in the past, to search through every part of the general specifications for clauses governing any one class of work.

MATERIALS.

One of the chief faults of ordinary specifications and practice in general is the failure to state specifically the requirements for proper control of materials used in the work. In order to overcome this difficulty, there is included in the new Rochester specifications a general provision that all materials used in any work covered by the specifications are subject to the approval of the Engineering Testing Laboratory; that the contractor must obtain the written permission of the Testing Laboratory, endorsed by the Engineer, before using any such materials; and that failure to obtain such permission shall be considered proof of the inferior quality of the materials in question. In addition, it is provided that if tests made after such materials have been used in the work shall prove conclusively that they are of inferior quality, then all work including such materials may be ordered to be torn out and replaced with approved materials at the contractor's expense, or deductions may be made from payments to the contractor in sufficient amount fully to compensate for the inferior quality of the materials. This provision is believed to be perfectly fair and yet to be severe enough to ensure proper control over all materials.

The specifications for aggregate for concrete contain another provision which is believed to be rather novel. This is a description of the method in which samples shall be taken. The purpose of this is to ensure that fair representative samples are taken in each case. The principles involved are too well understood to warrant description here. The novelty consists in including in specifications for materials, and as a part of the general specifications for any work, a statement of the method in which samples shall be taken.

The question of sand for concrete was given considerable attention. It has seemed difficult to obtain a uniform quality of sand in Rochester and on that account special study was given this matter. As a result, the specifications provide for a definite grading of sand, which it has been found possible to obtain locally, and

the use of the elutriation test, suggested by the Conference of State Highway Testing Engineers and Chemists, as well as the colorimetric test worked out by Professor Abrams and Oscar E. Harder of the Structural Materials Research Laboratory, Chicago.

A hardness test is required for coarse aggregate. Crusher-run stone, bank-run gravel or artificial mixes of fine and coarse aggregate are not allowed to be used except by special permission and in proportions determined in each case by the Testing Laboratory.

Concrete is defined in five classes for special uses, as indicated in the following table which is taken from the specifications:

Table No. 1—Classification for Concrete.

Class.	Proportion.*	Uses.
A	1:1½:3 (¼"-1" stone)	One-course sidewalks.
B	1:2:4 (¼"-1" stone)	1. Lower part of 2-course walks. 2. Copings and reinforced beams, slabs, and thin walls when directed.
C	1:2½:5 (¼"-1½" stone)	3. Concrete catch basins. 1. Pavement foundations. 2. Reinforced walls, etc., when ordered.
D	1:3:6 (¼"-2" stone)	Mass concrete when directed.
E	1:8 (Torpedo Gravel)	1. Around curb. 2. Sewer cradles.

*Note: Machine mixed—1 bag of cement taken as 1 cu. ft.
Hand mixed—1 bag of cement taken as 9/10 cu. ft.

In connection with the proportioning and mixing of concrete, special stress is placed upon the quality and amount of water used. It is required that mixers used by contractors shall be provided with automatic devices for measuring water, and also that no mixer shall be used which leaves to the judgment of laborers the proper proportioning of the ingredients of each batch. It is also provided that boom-and-bucket type mixers are preferred for use in pavement work, and that if mixers are provided with spouts in place of booms and buckets, the spouts shall have a definite slope believed sufficient to carry concrete of the proper consistency without stoppage or segregation of materials.

The specifications for bituminous materials set definite limits for each of the several classes of asphaltic cement allowed to be used. These limits are set tentatively as shown in Table No. 2, it being clearly provided that the limits shall be subject to revision from time to time as laboratory analyses indicate the need.

PAVEMENT CONSTRUCTION.

Special attention is paid to the preparation of the sub-grade and concrete foundation for pavements. It has

Table No. 2—Test Requirements for Different Asphalts.

	California Asphalts.	Mixture of California with Hard Natural Asphalts.	Bermudez Asphalts.	Trinidad Asphalts.	Texas or Mexican Asphalts.
Penetration at 77° F.	20				35-70
Soluble in carbon disulphide	98%		90-96	50-58	99.5
Loss by volatilization (325°)	5%				
Ductility at 77°—Penetration 50	40 cm.				
A. C. penetration at 77"	55-75	45-70	50-70	40-60	55-70
Proportion of flux	10:100		25:100	25:100	
Penetration (10 at 32°)	350 at 115°	300 at 115°	300 at 115°	300 at 115°	
Bitumen ductility at 77°*	40	20	30	30	30**
Loss by volatilization (325°)	5%	5%	5%	5%	3%
Final penetration (portion of original)	½	½	½	½	½
Maximum temperature	350° F.	350°	350°	350°	350°
Filler	10%	8%	10%	6%	10%
Bitumen (soluble in carbon disulphide)	9.5-11%	10-12.5%	10-12.5%	10-11.5%	10-11.5%
Minimum temperature	230° F.	250° F.	250° F.	250° F.	230° F.

*Penetration 50, Dow machine. **Add 2 centimeters for
Note: Table to be amplified by the Testing Laboratory.

each 5 points in penetration above 50 penetration.

been proved conclusively that many pavement failures result from carelessness in the preparation of the subgrade and from inferior workmanship in the foundation course itself. On this account the specifications state clearly the condition that it is desired to obtain in the subgrade before concrete is laid. Drainage is provided for by requiring the placing of four-inch vitrified pipe with bell joints in trenches back of the curbs. It is also provided that, when unstable soil conditions obtain in the subgrade, transverse trenches filled with broken stone or gravel may be required at such intervals and to such depths as directed by the engineer.

Before concrete is laid on the subgrade, the latter is required to be rechecked and placed in specified good condition. In place of specifying the standard 1:3:6 concrete, a 1:2½:5 mix is required with a thickness of 5, 6, 8 or 10 inches, according to the character of traffic and type of wearing surface. [For example, the five-inch base generally will be used only where a brick wearing surface with a cement-sand cushion is used.] The concrete is required to be shaped with templates, floated and carefully cured. In case a wood block wearing surface is to be laid, a roller-and-belt finish is specified.

In Rochester a stone-filled sheet asphalt is laid. The new specifications indicate that the binder course may be omitted in residential streets. Variations in the finished surface exceeding one-quarter of an inch in three feet, or three-eighths of an inch in six feet are required to be corrected as prescribed by the engineer.

The sand cushion, so long a source of weakness in brick pavements, has been eliminated from the new specifications and a thin cement cushion composed of one part Portland cement and four parts sand is substituted. A sand cushion may be used where traffic conditions are such that a grout filler cannot be used. In such cases a bituminous filler is required. It is believed that a grout filler and sand cushion are not a satisfactory type of construction in any case, and the sand cushion with bituminous filler will be used only in cases of absolute necessity under exceptional traffic conditions. The finished brick surface is required to be free from depressions exceeding one-quarter of an inch, as determined by the application of a ten-foot straight edge. Provision is made for the use of a small batch mixer equipped with a hooded spout reaching to the pavement for grouting brick pavements.

The sand cushion and sand filler have been eliminated from the specifications for wood block pavements also. As indicated in the foregoing, the concrete base is required to be finished with a roller and belt, and in such cases the blocks are laid directly upon a pitch coat applied to the concrete base. Provision is made also, however, where it does not appear practicable to roller finish the base, to use a mortar bed cushion with a bituminous paint coat. Bituminous filler is required in either case.

SEWER CONSTRUCTION.

In general, the specifications for sewer construction are those of the American Society for Municipal Improvements, certain modifications, of course, being made to meet peculiar local conditions. One addition to the specifications, which is not believed to be ordinary, is the requirement that blasting shall not be done within 100 feet of pipe laying.

SIDEWALK CONSTRUCTION.

It is believed that this is a matter which frequently is slighted in city specifications. The subgrade is required to be as carefully prepared for sidewalks as for pavements. The customary drainage course, ordinarily composed of cinders or gravel, is eliminated in general.

Where drainage is required, particularly in low spots, soft ground, etc., screened gravel or broken stone is required and outlet for water caught in this drainage course is provided for by specifying the use of three-inch farm tile connected with the nearest sewers.

It is believed that one-course concrete walks are more satisfactory in general than the customary two-course walks, so that in the new specifications one-course walks are specified for use on all residential streets.

CONCLUSION.

Further discussion of these specifications would demand unnecessary space. It is believed that enough description has been given to indicate the many new and desirable features involved.

First steps toward rewriting the Rochester specifications were taken about a year ago, when the writer prepared a tentative draft of new specifications which was submitted to the city engineer as a basis for discussion. Since then conferences have been held between representatives of the Engineering Department and of the Bureau of Municipal Research. The Engineering Department was represented by E. A. Fisher, acting city engineer, and assistant engineers I. E. Matthews and F. A. Delavau; and the Bureau of Municipal Research by the writer and J. O. Preston, assistant engineer, who, under the supervision of the writer, has been in close touch with engineering and construction work done by the city of Rochester during the last three years.

WATER WORKS OPERATION— RESERVOIR MAINTENANCE.

Drawing Off Foul Bottom Water—Removing Vegetation from Exposed Bottom—Preventing and Destroying Algae.

Water in reservoirs in the great majority of cases improves in character by standing, suspended matters settling out and pathogenic bacteria (if any are present) settling with the heavier matters or dying in a few days. Color, also, generally fades out gradually. Part of the improvement is due to oxygen from the air and to sunlight, and the effects of these do not penetrate to any great depth; consequently it is desirable that there be a vertical circulation that will bring to the surface in succession water from all depths. On the other hand, violent circulation or rapid motion will interfere with purification by sedimentation.

Slow circulation is produced by light winds and by variations in temperature between day and night, but does not extend to any considerable depth. An occasional storm will stir the water to a greater depth and bring to the surface, to receive the benefit of light and air, water that was below the general circulation. Such storm is also likely to stir up suspended matter on the bottom where the depth is less than 15 or 20 feet, and bring to the surface both this and the less pure water; the general effect, however, is beneficial. If the withdrawal of water from the reservoir can be discontinued for a day or two after such violent agitation, the character of the supply will be improved thereby. The shallower the reservoir the greater is the effect of this stirring up. Such objectionable occurrences can be avoided in most cases by deepening and sloping all parts of the shore so that the slope is not flatter than two on one, and the foot of the slope is at least 20 feet deep.

Water more than 15 or 20 feet deep is seldom stirred by wind, and any organic matter which may collect below this depth, receiving little oxygen from above, putrefies; color in the water at this depth is not bleached; and in

general this deep water may become foul, dark colored and ill-smelling unless it receives little or no organic matter to produce such conditions.

In the autumn, the surface water cools more and more as the average air temperature falls, and finally becomes cooler and consequently heavier than the water at the bottom and settles to and displaces such bottom water, forcing it to the top, bringing the accumulated pollution with it. This fall "overturn" often causes this foul water to enter the supply mains.

The general pollution of the reservoir in this way may be avoided by drawing off the foul water from the bottom before the overturn begins. If there is a blow-off pipe at the lowest part of the reservoir embankment or dam, this can be used for this purpose; or a pipe can be carried as a siphon from the deepest part of the reservoir over the bank and down the outside. (Such a siphon is described elsewhere in this issue.) This reduces the amount of water in the reservoir, which may be seriously objectionable; but on the other hand, the water so drawn off would probably be totally unfit for use. By such withdrawal it may be possible to avoid the gross pollution of excellent, potable water in the upper 20 feet of a reservoir.

Such pollution of the lower stratum of water will not occur unless the general supply contains considerable organic matter, and this of course should be prevented if possible. The drainage of swamps and preventing leaves blowing into the water will aid in this. Pollution in some cases is due to the fact that, when the water in the reservoir falls during the summer, a rank growth of grass and weeds takes place on the banks so exposed; then, when the reservoir fills again, this vegetation is submerged and dies. This should be avoided by cutting off the vegetation close to the ground just before the water reached it and removing it from the banks. Or, if it is dry, it may be possible to burn it off, although this of course should not be done if there is any danger of the spread of the fire. Paving the banks will wholly or greatly prevent the growth of vegetation on them.

ALGAE.

Odors and tastes in water supplies are caused in many reservoirs by the growth in them of algae of a number of varieties. Algae are vegetable organisms that develop in water only in the presence of light and that live upon organic matter. Many of them secrete an oil, which is released when the algae die and sometimes when they are broken up by violent agitation of the water caused by winds. Owing to their demand for light, they develop only in the upper few inches of the water if it be turbid, although in very clear water they have been found at a depth of twenty or twenty-five feet. They require oxygen for their development and therefore their presence in abundance combined with large quantities of dead organic matter may result in the putrefaction of the latter. Any sudden increase in the amount of organic matter in the upper layers of a reservoir, such as by the overturning above referred to or by such matter washed from the catchment area by storms, may cause a sudden development of algae with its resulting objectionable features.

Some of the algae found more commonly in the reservoirs of this country are the asterionella, which give a fishy or aromatic odor; anabaena, which give a grassy, green corn or nasturtium odor; uroglena, which give a fishy and oily odor. In addition to these there are perhaps a score which have been identified more or less frequently.

In order to prevent the odors and taste caused by the oil secretions of algae, it is necessary to either prevent

their development in the reservoir, kill them before the oil is secreted in any quantity, or remove them from the reservoir before the oil sacks have been broken. The first can apparently be effected only by preventing the entrance into the reservoir of the organic matter which furnishes their food (which is not possible in all cases), or by excluding light from the reservoir. While a reservoir must apparently be seeded by individuals of any particular specie before such specie can develop there, it is not yet known just how this seeding takes place. It is possibly through the agency of birds, since there will suddenly appear in a reservoir species not to be found anywhere else in the vicinity.

Light is excluded from small reservoirs by roofing them over, and this effectually prevents the growth of algae. But roofing large reservoirs would seem to be impracticable. Floating wooden roofs have been tried, but not with success so far as known; warping, rotting, breaking by storms, floating limbs of trees, ice, etc., are some of the reasons of failure.

For killing algae, the material now used almost universally is copper sulphate. This material was first used for this purpose by Moore and Kellerman of the U. S. Department of Agriculture in 1903, and its use studied by them; since which time considerable additional experience has been had in its use. It is important that the proper amount of copper sulphate be used, for too little will be practically ineffective, while if too much is used it may kill fish and other animal organisms in the reservoir, and the death of these may result in destroying the equilibrium in the reservoir between animal and vegetable organisms and result in the objectionable decomposition of one or the other. The amounts of copper used are so small that there is no possibility of any injury to the human consumers, which is further prevented by the fact that most of the copper reacts with any calcium which may be in the water and forms copper hydrate, which is precipitated. Organic matter in solution in the water tends to retard the action, but matter in suspension hastens the precipitation. In addition to hardness and amount of organic matter, the presence of carbonic acid and the temperature affect the amount of copper sulphate required. Kellerman, from his experiments, states that the following amounts are best for destroying the several algae named: Asterionella, 0.8 pound per million gallons of water; spirogyra, 1.7 pounds; anabaena, 0.8 pound; oscillaria, 1.7 pounds; uroglena, 0.4 pound; crenothrix, 2.5 pounds; beggiatoa, 41.5 pounds. Besides beggiatoa, only one organism named by Kellerman requires more than eight pounds. These quantities apply to water at about 60° Fahrenheit, the quantity to be increased by about 1 1/4% for each degree below this and decreased at the same rate for each degree above it.

In determining the amount to be used, the contents of the reservoir is to be calculated, including all water which will be reached by the treatment. This will ordinarily include all the water above the bottom stagnant layer, that is, all down to the depth that is reached by the circulation of the water when conditions are as they are at the time of application. Algae may sometimes be present at a depth a little greater than is reached by the copper sulphate, and later be brought to the surface by vertical currents caused by temperature changes or by wind, requiring a subsequent treatment. For this reason inspection of the reservoir for algae should continue after the treatment.

Copper sulphate is usually applied by placing the required amount of commercial blue vitriol in a bag of coarse cloth, a bucket perforated with nail holes, or a wire basket, and towing it behind a boat back and forth across the reservoir. It is generally found best

to draw the copper sulphate across in parallel lines about twenty feet apart. The number of trips can be halved by placing outriggers on the boat with a basket of copper sulphate at the end of each, so as to apply the solution in two lines at a time. The most desirable rate is found to be that secured by rapid rowing. (A motor boat may of course be used if one is available.) It is preferable to use too rapid a rate rather than one that is too slow, since in the latter case the desired amount of chemical might be completely used up before the entire reservoir had been covered. A strong wind blowing or any other condition that promotes the circulation of the water aids in the distribution of the chemical throughout the reservoir.

The blue vitriol kills the algae and they will then decompose more or less rapidly, releasing the oils, which may then be noticeable for a few days; although if it is possible to treat the reservoir when the algae first begin to develop, this can be very largely avoided. By having the chemical and appliances ready for instant use and by carefully watching the reservoir for appearances of algae at the season when they have been noticed in previous years, it may be possible to prevent their development in any considerable quantities. It is of course improbable that any treatment will reach all the algae present, and those not killed by the first treatment will serve as seed for starting another growth. It therefore generally is necessary to repeat the treatment at intervals throughout the season when the algae develop or while the vegetable matter that serves as their food is present.

The odors resulting from decomposition of the algae which have been destroyed can sometimes be kept out of the supply by by-passing the reservoir during and for a few days after the application of the copper. Some superintendents have found it possible to remove a considerable quantity of the destroyed algae by skimming them from the water along the lee side of the reservoir when there has been sufficient wind to cause them to collect there.

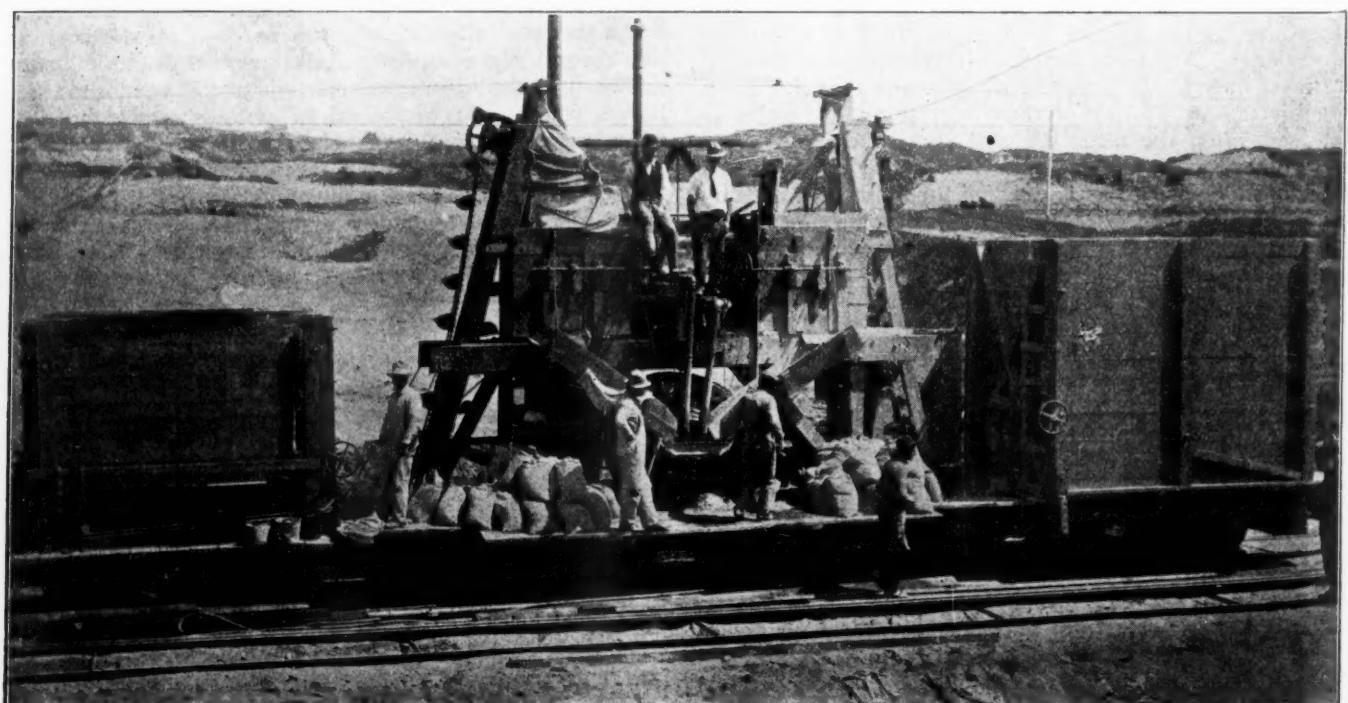
When water impregnated with algae taste must be



DISCHARGING CONCRETE FROM BUGGY THROUGH TUNNEL.

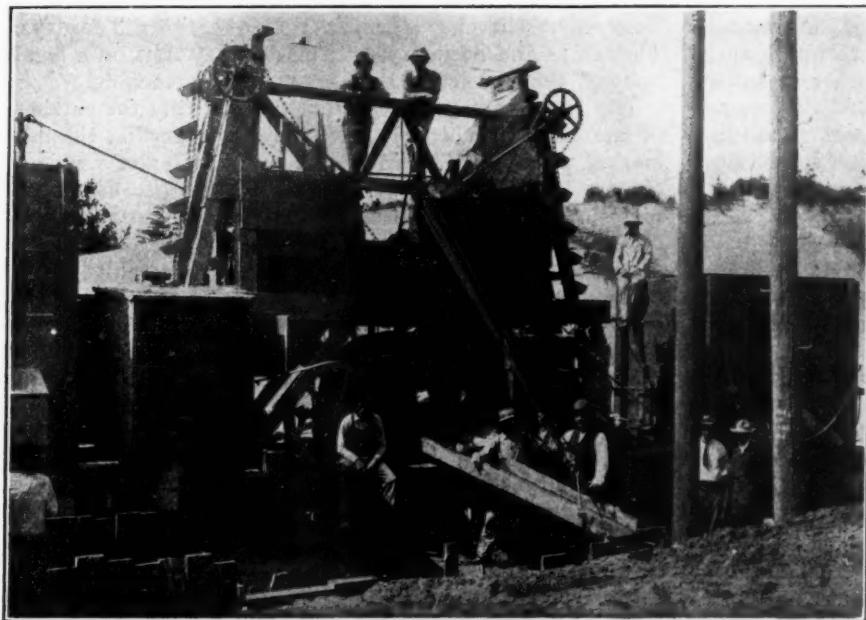
used, it is generally possible to remove the taste by aeration and filtration. One of the worst waters on record from this point of view, that of Springfield, Mass., was rendered palatable by aerating, passing through four filters in succession, and again aerating and filtering. The first filters clogged rapidly with masses of algae and needed to be cleaned frequently.

There are other animal and vegetable matters that sometimes are found in considerable quantities in reservoirs, such as plankton or vegetable growths that are not attached to the bottom of the reservoir, pollen and other vegetable matters blown from the fields and woods onto the surface of the water, etc. Most of these either float upon the surface or settle more or less rapidly to the bottom. Drawing them into the distribution system can generally be avoided by withdrawing the water from the reservoir at a point a short distance below the surface—say about three to five feet. Where the outlet from the reservoir is not so constructed as to permit withdrawing the water from such depth, this can sometimes be effected by constructing around the outlet a



REAR VIEW OF PORTABLE CONCRETE MIXING PLANT.

In the center, pipes leading from water barrels to mixer. On each side of these, chutes for charging sand and broken stone into mixer, these being released from measuring boxes by sliding doors raised by rack and pinion operated by hand wheels.



FRONT VIEW OF PORTABLE MIXING PLANT.

floating structure of wood carrying a continuous submerged baffle of wood or other material, thus requiring the water withdrawn to pass under the baffle. The baffle should be as long as possible—that is, incloses as large an area around the outlet as may be—for if the

be the same as for large.

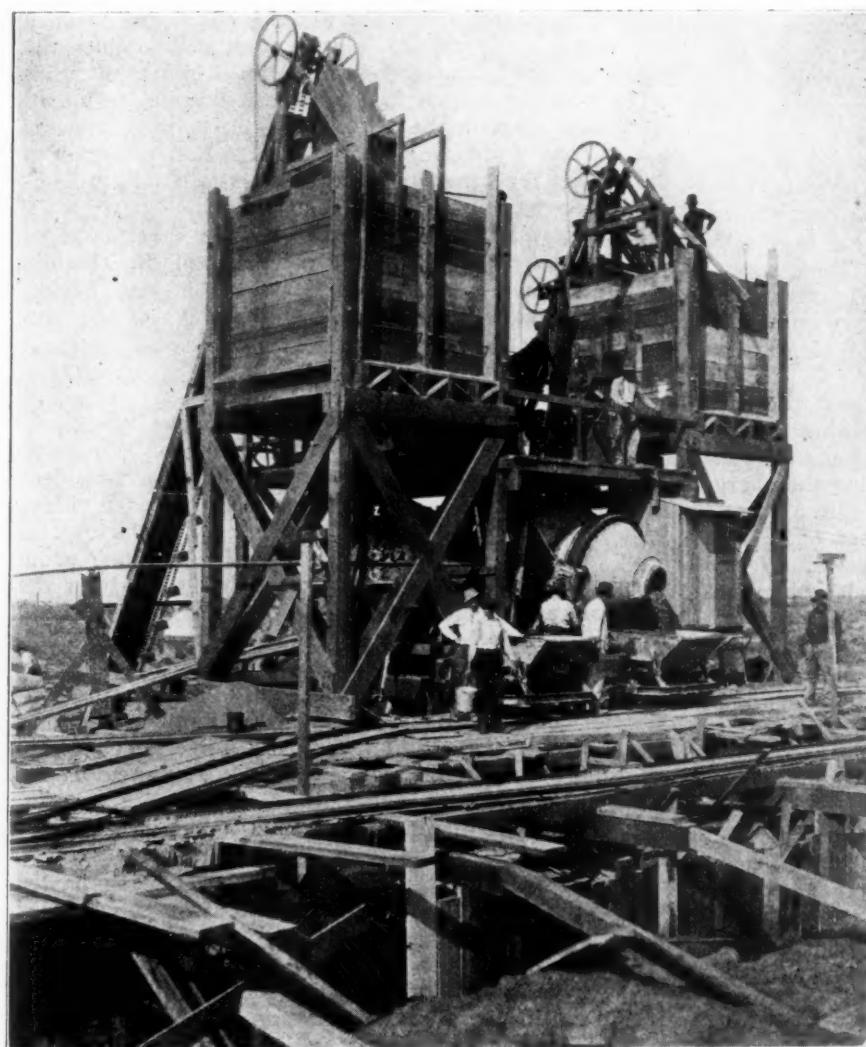
(To be continued.)

TWO SEWER CONSTRUCTION PLANTS.

In constructing a concrete sewer through an outlying section of San Francisco, the Metropolitan Construction Company took advantage of the fact that the sewer ran parallel and close to a double line of street railway tracks and rented the track alongside of the trench for construction purposes, use of it for passenger traffic being discontinued until the work was completed.

The contractor used for constructing this sewer a concrete mixing plant that was mounted on railway trucks and moved from point to point so as to discharge the concrete directly into the sewer forms. The plant was in three units, the middle one consisting of a mixer, two measuring bins located above it, and at each end of this unit a conveyor for raising the fine and coarse aggregate respectively into the bins. The two end units consisted of large bins or bunkers for holding the sand and broken stone used for the concrete. Each bunker was provided, at the bottom of the end nearest the mixer, with a sliding door, through which door the aggregate was discharged directly into the elevator buckets. Above the mixer was a working platform on which the operators regulated the doors from the measuring bins, by which the aggregate was discharged into the mixer by gravity. The central unit also carried water barrels from which, through a pipe leading to the mixer, water was supplied by gravity. The mixer and elevators were operated by electric motor, power being taken from trolley wires above the track.

As the mixer was set upon the platform of the car, it was possible to obtain a good fall through a chute for



STATIONARY CONCRETE MIXING PLANT FOR BUILDING 8-FOOT REINFORCED CONCRETE SEWER.

carrying the concrete to the sewer forms, and the concrete was discharged directly into the forms through such chute. Where for special work or if for other reason it was not desirable to discharge directly into the forms, the customary two-wheel concrete buggy was used, discharging into the forms through a sheet-iron funnel and spout.

Another plant which, however, was fixed in position is shown by one of the illustrations, this being used for constructing an eight-foot reinforced concrete sewer in Forty-sixth avenue. The broken stone and sand were elevated by conveyors to two bunkers which were built slightly higher than the mixer. From these the aggregates were discharged onto and measured on an elevated platform and then dropped into the mixer. The concrete was delivered to the work in side-dump cars running on construction track, each car holding a batch of concrete. In this plant also, the mixer and the conveyor were operated by electricity.

LONG BEACH MUNICIPAL MARKETS.

Outdoor Markets and Fish Market Pay All Expenses from Small Fees Charged.

The city of Long Beach, Cal., has maintained municipal curbstone markets since March, 1913, but it was not until 1918 that it established a fish market, which is believed to be unique among municipal markets.

The outdoor curbstone market was adopted because the Southern California weather permits an outdoor market the year round without serious inconvenience. In addition, one block from the business center of the city is located Pacific Park, the streets surrounding which are quite wide. The market idea was originally started by the Woman's City Club, joined later by the Chamber of Commerce and other citizen organizations. The committee appointed by these organizations operated the market at first, all of the funds used being contributed privately. From the beginning the market has been self-supporting, no public funds ever having been appropriated for it. At the outset there was a vigorous campaign of advertising and on the opening day one thousand market baskets were given away to those who patronized the market.

Although no public money was appropriated, the consent of the council had, of course, to be obtained for the use of the streets, and ordinances were passed providing for adequate regulation and permitting the charging of a fee.

The market began by occupying 300 feet on Pacific avenue, later spreading to 300 feet on Broadway and 600 on Cedar avenue, but this last stretch was abandoned later, and the market is now confined to the two 300-foot stretches. Each vendor is allotted six feet of curb and a distance of 18 feet at right angles to the curb on Broadway and 20 feet on Pacific avenue.

The fees which vendors have paid has varied from time to time, but at present is 25 cents a day, in addition to which non-producers pay a regular city license of \$5 per year, which goes into the city treasury. In return for the 25-cent fee, the market department supplies each vendor with a table and umbrella and a stall number which must be kept in plain sight, and sweeps the streets after the market is closed.

A market master and an assistant constantly patrol the market while it is in use to insure strict compliance with the rules. Experience at Long Beach is believed to prove beyond doubt that the successful conduct of a public market requires the constant supervision of a market master who devotes time and study to market conditions, prices, quality of produce sold and strict enforcement of sanitary regulations. The market is open

from seven in the morning till twelve on Tuesdays, Thursdays and Saturdays. If market day falls on a legal holiday, the market is held on the day preceding.

The fish market resulted from the fact that the catches of mackerel in February, 1918, were so large that the fish market at the outer end of the municipal pier was not able to handle all of the fish caught and the fishermen sold them directly to citizens as they left the shore end of the pier. These sales became so popular that within a few days a crowd of a hundred or more assembled every afternoon at four o'clock when the fish boats arrived to purchase direct from the fishermen. In order to provide some regulation for these sales, a location directly under the pier was selected and tables, scales and wrapping paper furnished, no charge being made therefor.

After a month better quarters were provided in a room on the lower deck of the auditorium, where cleaning tables and wash tanks were placed. The vendors were supplied with aprons, towels and scales, and a charge was made of one cent per pound on all fish sold. This arrangement proved very popular and has been continued under rules prescribed by the Public Affairs Department.

When this market had been in operation for a short time it was found that prices charged by vendors were unnecessarily high and a private fish market at the outer end of Pine avenue pier was taken over by the city, newly equipped, and a municipal fish market opened which reduced the price of fish and since then has established retail prices. In connection with this, in August, 1918, a kippering plant was put into operation where tuna, herring, mackerel and other fish are cured and smoked and find a ready sale at a price that well justifies the venture. The fish market was equipped by use of funds taken from the market fund and no tax money was used in connection with the project. In six months from its opening on April 1st the fish market had returned to the market fund the original cost of installation, in addition to paying all operating costs.

The municipal markets are under the supervision of the Department of Public Affairs, Eugene E. Tincher, commissioner. S. F. DuRee is market master, having occupied that position since the early days of the municipal market.

REFUSE DISPOSAL IN WINNETKA.

Prior to 1917, the refuse of the village of Winnetka, Ill., had been handled under contract by a non-resident farmer, whose employees were not directly under village supervision, and the service was very unsatisfactory.

In August, 1917, a new plan was inaugurated, using municipally owned equipment specially designed for the purpose, and operated by collectors reporting directly to the village office. This service consists of three collections of garbage each week, with a similar collection of ashes each week during the winter. For this service a small charge is made, based on the number of rooms in the house. In addition to this, a universal collection of rubbish is made on regular schedule every two weeks. The entire service is under the direction of a superintendent, who is directly responsible for service and for operating costs.

Under the present plan, the garbage is being hauled out of the village and disposed of to farmers, who feed it to pigs. Ashes have been placed upon unimproved streets of the village, in order to partially alleviate the muddy condition during the spring months. Rubbish, including tin cans, broken crockery, etc., is being hauled to some vacant lots owned by the village and used for fill. Before beginning the fill, about two feet of top soil was removed and sold at a price which offsets the cost of removal.

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SPECIFICATIONS FOR PUBLIC WORKS.

The writer once, as a young assistant in an engineer's office, watched and wondered at the evolution of a set of specifications for a sewerage system. At that time (about thirty years ago) there were no "standard" specifications and few of any kind that were worthy the name, and this engineer had never before built any sewers. He read the few books available on the subject and several sets of specifications used by other cities. Whenever he found an idea or a paragraph that impressed him favorably, he adopted it as a part of his specifications. Finally he grouped these paragraphs under heads, labeled the whole "Specifications," and received bids on the basis of these and the plans. The writer later had charge of the work under these specifications, and found his suspicions justified. They were so contradictory, so redundant at some points and so entirely lacking at others, that in many features of the work the contractor could not be held to any particular instructions.

Specification writing has improved greatly since then, but still has a long way to go to reach perfection. Specifications are still put together bit by bit and year by year; new ideas and developments in the art give rise to new paragraphs without sufficient care being taken to adjust all the original ones to accord with the new. On the other hand, recent legal decisions are not always noted and specifications modified to comply with them, and many discredited ideas are still found.

Perhaps the most common faults, and ones to which the others are partly due, are the lack of logical or intelligent arrangement of the several parts of the specifications and the inexact or improper use of the language employed to express the ideas. It would seem to be necessary that specifications be written by engineers, and unfortunately engineers as a class are lacking in ability to arrange their ideas in logical order and to express them in precise, correct and understandable language. It is one of the criticisms most often made of our engineering schools that this drawback is to be found in most of their graduates.

Specifications should tell a contractor just how the engineer expects him to carry on the work. Since they form part of a legal agreement, they should stand the test of law and should be scrutinized carefully, as to both

requirements and forms of statement, by a lawyer thoroughly informed in the law of contracts. Finally, the instructions should be so arranged that all those referring to any given feature of the work may be found readily; they should be expressed so clearly that there can be no misunderstanding any part of them; each word should be precisely the one to express the intended meaning, and the punctuation should further rather than defeat the intention of the writer.

Specifications are as essential as plans for securing the construction of a piece of work in the way and form desired. Inconsistency in the former is as serious as plans showing an inch pin to fit into a $\frac{3}{4}$ -inch hole. Conflict of the specifications with the law of the land may be as serious as conflict of the plans with the law of gravity. Lack of precision in the use of words may lead to as much misunderstanding as failure to indicate certain dimensions on the plan, necessitating scaling the drawing to determine them.

An engineer who makes perfect plans but imperfect specifications for public works has done but half his duty, and in some cases by no means the more important half.

PAVEMENT FOUNDATIONS.

For years the problem before paving engineers was to prevent destruction of the surface by abrasion of iron tires and impact of horses' feet. This problem is fast disappearing—has to a large extent disappeared, not only because rubber tires and motor traction are taking the place of iron tires and horses, but also because surface materials and constructions have been developed to resist both fairly well.

But the change from horses to motors has resulted in heavier loads also, and the problem these present is to a large extent one of foundations. It is true that some surface materials in common use will not withstand the heaviest loads without rapid wear, but pavements can be laid that will, provided the foundation does not yield. If the foundation will not support the loads brought on to the pavement, however, no kind of wearing surface will last.

This has been said many times, and it is self-evident to anyone. And yet cities keep right on laying the same thickness of base that they have been using for the last ten years or more; and use the same thickness on all streets and under all kinds of wearing surface. If six inches of concrete is enough now under eight and ten-ton loads, it was too much a few years ago when three and four tons were the maximum. If it is not too much now on residence streets, it is too little on those carrying motor truck traffic from freight depots. And if six inches is not too much on a soil of solidly packed hardpan it is much too little on soft loam or over trenches that, no matter how carefully refilled, are sure to settle somewhat in spots.

This failure to make any adaptation of thickness of base to load to be carried or to nature of soil can not be charged against all cities, we are glad to say. As told elsewhere in this issue, Rochester, N. Y., uses thickness of base varying from 5 to 10 inches, giving a theoretical range of strength of 400 per cent; the 5-inch base being probably stronger than the average 6-inch because of the richer mix of concrete used. Other cities increase the thickness or use reinforcement where the base is laid over trenches (instances of such use have been described in the Municipal Journal). These are the exceptions; but until it becomes the rule to adapt the strength of pavement base to the duty it has to perform, it can not be claimed that pavement construction is on a scientific basis.

The WEEK'S NEWS

Oregon's Highway Expenditures—Convict Labor on New Jersey Highways—Influenza—Government's Widespread Venereal Disease Campaign—Natural Gas Waste in West Virginia—Reorganization of Indianapolis Police Department—Policewomen in Washington—Ohio Municipalities Organize for Financial Relief Legislation—New York State's Reconstruction Commission—Garbage Collection in Spokane and Indianapolis.

ROADS AND PAVEMENTS

Oregon Spent \$3,000,000 on Roads.

Salem, Ore.—A statement issued by the state highway commission as part of the biennial report shows the total amount of money received from all funds during the years 1917 and 1918 was \$3,561,790.37. The total expenditures were \$2,888,257.68, leaving a balance on hand of \$673,532.69. These amounts are classified as follows: Quarter mill tax fund—Total receipts, \$546,260.51; expenditures, \$528,789.99; balance on hand December 1, 1918, \$17,470.52. Automobile license fund—Receipts, \$575,000; expenditures, \$281,902.67; balance, \$293,097.33. Six million dollar bond fund—Receipts, \$2,050,045.42; expenditures, \$2,049,025.47; balance, \$1,019.95. Bean-Barrett bonds—Receipts, \$390,484.44; expenditures, \$28,539.55; balance, \$361,944.89. The report to the governor shows that an average of six proposals were received for each issue under the \$6,000,000 bonding act. Work accomplished during the biennium is summed up as 50 miles of hard surface laid, 111.8 miles of broken stone or gravel, 134.5 miles of roadbed graded and 40 bridges built. "With the close of the war," says the report, "and the prospect of declining prices of material and a more plentiful supply of labor the commission looks forward to 1919 as a year in which a great deal can be accomplished, and at this date a tentative program has been prepared providing for the improvement of state highways in every county of the state." Under the post road law 17 projects have been agreed upon, according to the statement, and up to the present time ten have been approved, three disapproved, two are pending and two are in preparation. Under the forest road law 14 projects have been approved. Construction has been started on four of them and several will be carried over into the 1920 program.

State Labor Supervisor for Highway Work.

Trenton, N. J.—State highway engineer W. G. Thompson has submitted to the state highway commission a complete outline of what the department intends to accomplish by the use of state labor during the present year. It is proposed, Mr. Thompson reported, to continue and complete the relocated section of route No. 1, between Menlo Park and Rahway, with reformatory labor, which will be quartered at the institution, thereby obviating any additional expense for housing. The section of route No. 13, between Kingston and Ten Mile Run, now being constructed with labor from the state prison, will be continued, the men being housed at the camp along the Brunswick turnpike, near Monmouth Junction. It is proposed to proceed with all possible energy on the construction of the section of route No. 9 over the West Portal hill, from the end of the macadam pavement at Perryville to West Portal. Convicts from the state prison engaged in this work are housed at the camp recently established on the West Portal hill. At the height of the season about seventy-five men from the Rahway Reformatory will be engaged in road work, and about 225 from the state prison. Mr. Thompson's report said: "Inasmuch as the three projects above mentioned will just about utilize the equipment we now have, it is considered undesirable at this time to locate additional camps or start new projects which would require the purchase of additional equipment, until the present installations have, beyond the shadow of a doubt, demonstrated their value. This does not mean that this

office has any doubt as to the value of the work of these men, but that it is unwilling to incur additional expense for equipment until the free labor situation is more nearly normal, inasmuch as we have had much difficulty in securing competent mechanics from the ranks of free labor to keep our equipment in repair. We may, during the summer, increase the number of men employed on these three projects, but cannot at this time recommend increasing the present camp facilities." H. C. Shinn, assistant division engineer of the central division, was appointed supervisor of state labor at an annual salary of \$3,000.

Work Stopped on Utah Desert Cut-Off.

Salt Lake City, Utah.—Work on both the Fisher and Goodyear sections of the Lincoln Highway in western Utah has been stopped for the winter owing to the cold weather and to the excessive moisture which has been experienced on the Desert. The gang of convicts which had been working in Fisher Pass for the past five months has been returned to the state prison, and the machinery and equipment used in the construction of the cut-off across the Desert has been stored for the winter. The free men working on the Desert with tractors and graders have accomplished the completion of twelve miles of grade to a width of 20 feet and a height of 3 feet above high water. The convict gang working in the Fisher Pass has completed three and a half miles of good, graded surface mountain road, 15 to 18 feet wide, and drained on the upper side. There remains about 2,000 feet of the Fisher Pass road to be completed, this all on the west side of the Pass, and about five miles of grading on the Desert construction and the graveling of the entire section. Work will be renewed on both sections at the earliest possible date in the spring, according to the advice of Ira R. Browning, state highway engineer of Utah, and will be carried through to completion, if possible, by June 1st, at which time it is expected to dedicate the route and open it formally with ceremonies, in which the governors of both Utah and Nevada will participate, as well as officials of the Lincoln Highway Association.

SEWERAGE AND SANITATION

Declares Influenza Cause Is Unknown.

Albany, N. Y.—According to a statement by Dr. Hermann M. Biggs, state commissioner of health, in this state in the month of October alone approximately 32,000 lives were lost, while in the country as a whole 400,000 people are believed to have died of so-called influenza during the months of September, October and November. "It is questionable," says the statement, "if any recorded epidemic has produced in a similar space of time such disastrous results, yet, despite the efforts of an army of research workers both here and abroad, the definite causative agent of the disease remains today unknown. Until proof to the contrary is forthcoming it must be assumed that the epidemic represented a very virulent form of the same disease which has spread throughout the world from time to time for many centuries, and numerous excellent records of which are available for study in medical literature. At the present time there is no exact diagnostic procedure which may be relied upon positively to differentiate epidemic influenza from severe 'colds' accompanied by fever.

cough and prostration, and frequently followed by pneumonia, such colds being due to a variety of well-known organisms. Nevertheless there are certain fairly characteristic symptoms in typical cases of epidemic influenza which at present justify a clinical diagnosis of that disease. Investigation by the State Department of Health of the many cases now being reported as epidemic influenza lead to the conclusion that a majority of them should not be so classed, as they lack the characteristic symptoms of that disease. On the other hand, it cannot be denied that sporadic cases of epidemic influenza are occurring in many communities throughout the state, the greater number of such cases, in proportion to the population, being reported from localities which were not heavily attacked during the epidemic, which fact, together with the great infrequency of recorded second attacks in the same individual, justifies the belief that the disease confers a more or less lasting immunity, and that therefore no extensive return of the epidemic is to be expected immediately. There is now fairly general agreement among investigators of epidemic influenza that the disease is spread by personal contact from one individual to another, in all probability in the very earliest stages. It is therefore highly desirable that persons presenting the symptoms should, in so far as possible, be isolated within their own rooms during the first few days of their illness. On the other hand, the extreme measures taken against the spread of the disease, which were put into force during the height of the epidemic, are not at the present time to be regarded as necessary or desirable."

Soldiers as Health Propagandists.

Washington, D. C.—The United States Government is losing no opportunity to aid in the campaign being carried on throughout the nation by the U. S. Public Health Service under Surgeon-General Rupert Blue, for the suppression of prostitution and the eradication of venereal diseases. Each soldier and sailor as he receives his discharge is urged to remember what he has been taught while in the service in regard to the dangers of venereal disease. The men are given a specially prepared pamphlet on the subject, and are asked to carry the Government's message of social sanitation back to their home town. Army and navy officers who have seen the practical value of the education on sex matters which has been given to all enlisted men are, in the opinion of the surgeon-general, particularly fitted to carry the propaganda against venereal disease back to their home communities, and a great many of the officers who have returned from abroad have signified to Surgeon-General Blue their intention of aiding in the work in their own states.

San Francisco Remarks.

San Francisco, Cal.—Following a recurrence of the epidemic of influenza, the board of supervisors has passed another ordinance ordering compulsory remasking. There has been considerable opposition to the plan and an anti-mask league has been formed. There are between five and six hundred new cases reported every day. The recurrence is reported throughout the West.

"Health Sunday" Proposed.

Washington, D. C.—Dr. Rupert Blue, Surgeon-General of the United States Public Health Service, has asked the ministers of the country to set aside February 9 as Health Sunday and to preach sermons emphasizing the responsibility of the nation to protect returning soldiers and sailors and the community at large, and to take vigorous measures for combatting venereal diseases. A proclamation by the Surgeon-General has been sent to all ministers, with the request that they read it from their pulpits February 9. It states that the government is asking the churches of the country to take an active part in meeting a great national emergency, and that the war made it necessary for the nation to face frankly and courageously the menace of the venereal diseases. "In the army and navy a program of law enforcement, medical measures, education and provision for wholesome recreation was adopted," Dr. Blue states. "This program brought results. Now that the war is over the cities and towns through

which the soldiers and sailors will go and to which they will return upon demobilization must be made as safe as the camps from which they have gone. The fight against this menace to our national vitality and to our homes must be vigorously continued. It is the social responsibility of the communities, of which the churches of every denomination are a part, to continue the work carried on in time of war in order that the world may be made safe not only for democracy, but for posterity."

State Advertises in Newspapers in Disease Campaign.

Trenton, N. J.—Full page advertisements are being used in newspapers throughout the state by the Bureau of Venereal Disease Control of the state department of health in its campaign to awaken the state to the menace of the venereal diseases. The advertisements are prepared from material supplied by the U. S. Public Health Service and tell in clear language what the conditions are and how and why "The Country Must Be Kept Clean." Quotations from W. G. McAdoo, Newton D. Baker and Josephus Daniels are presented. The lessons of the war are described and venereal diseases are declared to be a peace problem as well as a war problem. The readers are told that "you can keep your red-light district closed and suppress commercialized prostitution of all kinds." Provision for treatment, education and wholesome recreation is urged. City officials and citizens are called upon to aid the work and all are urged to send for free literature on sex hygiene.

STREET LIGHTING AND POWER

Town Votes to Sell Electric Plant.

Howell, Mich.—At a recent special election held here on the lease, franchise and sale of the Howell electric light plant to the Detroit Edison Co., the proposition was adopted by a vote of 709 yes to 70 no. The sale will be made for a gross consideration of \$50,000 and is to become effective at once. The electric light plant has been operated by the municipality in connection with the water works for about 30 years. Both men and women voted, but the vote was not a heavy one.

U. S. Order Stops Natural Gas Waste.

Charleston, W. Va.—Wasteful usages of natural gas, such as burning it all day to save the trouble of turning it off, are to be reported hereafter to the United States fuel administration, under a new order. Existing shortages of natural gas may be alleviated in some measure, fuel administration officials said, by the order, which says: "It shall be deemed wasteful to burn natural gas by means of flambeaux or open lights; to burn natural gas for the purpose of outside lighting during daylight hours; to burn natural gas in inefficient appliances; to burn more natural gas than is reasonably necessary for the purpose which it is intended to serve; or to consume natural gas in any other manner which is not reasonably efficient and economical. Licenses are hereby directed to report to the United States fuel administration all cases where consumers persist in the wasteful use of natural gas." The order was issued because of instances where natural gas was allowed to burn carelessly, even when under meter regulation, as well as for the guidance of so-called "free" consumers, whose gas costs them nothing, it was stated. Various attempts were made during the autumn to persuade "free" consumers to limit themselves to 200,000 cubic feet a year, but these were unofficial as regards the fuel administration. The natural gas situation has become steadily worse during the last few years. In many parts of the country it is critical. The losses in connection with use of natural gas are greater relatively than those of any other fuel. As an example, it was pointed out that last winter in Louisville, Ky., when the supply of natural gas failed, it was found that 1.9 per cent of the consumers were using 30 per cent of the natural gas. This was due in part to the consumption of natural gas in converted coal furnaces, a wholly improper appliance for burning natural gas according to fuel administration engi-

neers. Public utilities commissions are now prohibiting the use of natural gas in appliances not primarily constructed for such use. The so-called free gas feature has been especially troublesome and has resulted in depriving many domestic consumers of an adequate supply of best fuel available for household use. In an extensive investigation of the amount of gas consumed by domestic consumers in West Virginia having this so-called free gas service privilege (on account of having gas wells or gas lines on their farms), it was found that the average consumption per free consumer a year was 480,000 cubic feet. This is a waste of at least 350,000 cubic feet for each free consumer a year. There are at least 4,400 free consumers in West Virginia, and at this rate of waste this item alone amounts to 1,540,000,000 cubic feet a year.

Rate Increases Granted.

Los Angeles, Cal.—A decision recently made by the California state railroad commission grants a liberal increase in rates to the Southern California Edison Company. Coming with the opening of the new year and following several similar increases in rates granted to other public utility companies in California it is regarded as a significant development. Not only is the increase granted to the Southern California Edison Company liberal in terms, but the wording of the decision shows a sympathetic appreciation by the California railroad commission of the difficulties under which the public utility companies have been operating since the outbreak of the European war. The following is an extract from the opinion: "I am satisfied from the showing made that applicant, because of the increase in the price of materials and labor, is entitled to an increase of revenue, and that therefore rates to consumers must be increased, and I am also convinced that we will be acting with entire fairness to applicant, as well as to consumers, if we fix rates so as to put applicant in as good condition as it was before these abnormal increases in cost. If the rates set out in the attached order result, as expected, in restoring applicant to its pre-war financial condition it seems reasonable to anticipate that applicant will not be handicapped because of insufficient revenue in financing appropriate extensions and betterments." John B. Miller, chairman of the Southern California Edison Company, in commenting on the decision, said: "The increase in rates recommended by the investigating commissioner and unanimously agreed to by the other members of the California railroad commission will mean an annual increase in revenue of approximately \$1,000,000. While this increase granted is gratifying to us, what is even more gratifying is the judicial spirit of fairness shown by the commission in its recognition of the difficulties of the abnormal conditions under which the public utility companies generally have been operating. Notwithstanding the various increases in rates granted by the railroad commission rates in California generally are lower than the average rates throughout the United States. This is due to the fact that a very large proportion of the load is carried by water power."

FIRE AND POLICE

Police Department Reorganized.

Indianapolis, Ind.—The reorganization of the police department, which went into effect at the beginning of the year, is now in full operation. There were changes in personnel, working hours, filing systems and important administrative reforms—besides a new attempt of the officials to make the work of the department more effective. Mayor Jewett, in a speech to the men, declared that while good work had been done by the department along certain lines, the department's record in regard to "blind tigers," gambling and prostitution had been anything but satisfactory. "I have been informed," said mayor Jewett, "that gambling has been going on in the very shadow of the city hall. Why is it that none of you patrolmen knew that that was going on? If there is any reason why any of you patrolmen—personal, political or otherwise—can not

arrest any law violator within your district, then the thing for you to do is to take your badge to the chief of police and resign, because it is your business to enforce the law and if you can't do this you are not doing the duty the city has employed you to do. The merit system will be strictly adhered to under the reorganization plans. Every member of the department will have an opportunity to show what is in him. If you are interfered with by any influence or slowed down by any insinuation of a superior officer, the board of public safety wants you to go ahead and do your duty and your reports on your districts will determine your records, regardless of whose toes you step on." Mayor Jewett said he attributed a large part of the failure of many policemen to do their full duty in regard to the suppression of "blind tigers," gambling games and other forms of vice to the fact that they had been influenced to some degree by politicians. Such practices, if true, must stop immediately, the mayor said. The words of chief Coffin to the patrolmen and sergeants in a previous statement to the effect that they are to be held directly responsible for any law violations in their districts and divisions were emphasized by mayor Jewett, who pointed out that the man in whose district a gambling game, "blind tiger," resort or other law violation is found, will have to answer for it to the members of the board of safety.

Civil Service Eligible Lists Abolished.

Toledo, O.—The civil service commission, subject to the sanction of the director of law, has adopted a resolution abolishing the eligible lists of the police and fire divisions which were established during the recent period in which it was found necessary to modify the requirements and students as to fitness and eligibility. This action has been taken because a number of the members of these departments now on leave of absence are about to return to civil life after having completed their terms of enlistment in the army and navy. Also many applications for positions in these departments have been submitted to the director of public safety by returned soldiers and sailors "who by the very nature of their training and experience while in service are eminently fitted to perform the duties of patrolmen and firemen—and further it being the opinion of this commission that it is the moral duty of all employers, especially during this great reconstruction period, to use every power to furnish lucrative positions for those valiant men."

Capital to Have Thirty Policewomen.

Washington, D. C.—Major Pullman, chief of police for the District of Columbia, has asked the United States Employment Service, Department of Labor, to obtain thirty policewomen for his force. His experiment in employing Mrs. Leola N. King as traffic officer has proved a success, and now, wherever most needed, he will place other women in the crowded streets to direct vehicles and safeguard life. And he has much other work for them to do. Mrs. King is the wife of Capt. E. H. King of the United States Medical Corps, and long has been interested in social problems. "We now have a women's bureau in the police department," says Major Pullman. "Two are college graduates and two have had training as nurses. One of my assistants is the sister of a United States Senator and another is a woman of wealth who desires to help. Mrs. Arthur B. Spingarn, who for several years was director of investigation in court work for the New York Probation and Protective Association, is head of the bureau. No woman need apply to the United States Employment Office for a place in our woman's bureau who does not have social conscience and a desire to help humanity. For the woman who just wants a job we have no place. I want to elevate the standard of police work, so that it will attract women of good education and best ability. The problems that confront us are often so delicate and intricate that they can be properly handled only by trained women. Police work is something more than supplying a man with a club and telling him to go forth and put all the bad men

in jail. Our object is prevention rather than punishment, and it is because of the new appreciation of police ethics that the presence of women in police work is so necessary. It is the object of the woman's bureau to handle most of the crimes committed by women or against them, and to investigate conditions that place girls in danger. To this end the bureau has made a survey of conditions in Washington. In this survey have been included hotels, rooming places, boarding houses, rest-rooms, automobile services, burlesque shows, dance halls, movies, parks and playgrounds. Working conditions also have been investigated. We are co-operating with all the existing agencies in Washington that are concerned with the rehabilitation of wayward girls. We have on file the record of every girl brought to our attention. The first time a girl commits larceny we are interested even more in the conditions that led to the commission of the crime than we are in the culprit, because it is only by making a study of these conditions that we can hope to prevent a similar offense. We have a large detention-house, which we expect to remodel so as to keep juvenile offenders apart from immoral girls. Some of the things that I shall require of the thirty policewomen whom I am asking the United States Employment Service to secure are to discover conditions needing correction, to supervise amusement places, to aid in locating runaway girls, to follow girls and warn them of danger, to befriend girls whose home life does not afford protection of the right sort, and to do personal work with women and girls."

Two Firemen Killed in Collapse.

New York, N. Y.—A three-alarm fire at a truck delivery garage resulted in the death of two firemen and the serious injury of three others. Many other firemen had narrow escapes from being trapped and losing their lives when the walls caved in. The men who were killed were on the roof of a shed just behind the burning two-story building. They had no more than climbed up when the rear wall of the burning structure collapsed and buried them in an avalanche of hot bricks. Every effort was made to save the men; streams of water were played on the burning debris and the firemen tried to jack up the beams which pinned their comrades down, and after great effort, they succeeded in extricating one. For more than an hour the rescue party worked to free the other two men.

GOVERNMENT AND FINANCE

Ohio Cities Organize For Financial Relief.

Columbus, Ohio.—Mayors of thirty leading Ohio cities have met here and set up an organization which will go before the legislature with a definite program of taxation so far as relief of cities is concerned. The meeting was presided over by mayor Davis of Cleveland. Representatives of cities plan to enlist the chambers of commerce of the state in their relief campaign. As the result of the discussion city manager Barlow of Dayton has drafted and submitted a tentative draft for a proposed law which it is believed will bring the desired financial relief to the cities of the state. Copies of the draft have been sent to the city solicitors of the various municipalities with the request that they look it over and make further recommendations. A summary of the suggestions that are received by city manager Barlow will be incorporated into a measure which is being prepared by the city attorney of Dayton and will be submitted to the state legislative body. The committee in charge of the construction of the bill consists of J. E. Barlow, city manager, Dayton; F. L. Biggs, director of public service, Ironton; W. H. Brown, city attorney, Cambridge; George E. Caylor, city solicitor, Delaware; J. S. Martin, Toledo; C. J. Neal, finance director, Cleveland; Kenyon Riddle, city manager, Xenia; B. F. Robinson, president of council, Bucyrus; Stewart L. Tatum, attorney, Springfield; E. L. Weinland, member of council, First National bank building, Columbus; Saul Zielonka,

city solicitor, Cincinnati. The tentative recommendations submitted by Mr. Barlow are:

To permit issuing of bonds, as to which a vote of the people is required, upon approval of a majority of electors voting at the election instead of two-thirds, as at present.

To permit levies for sinking fund and interest on all bonds, heretofore or hereafter made, outside of the ten-mill limitation.

To abolish all limitations on tax levies for sinking fund and interest on bonds and additional tax levies authorized by a vote of the people.

To authorize municipal legislative bodies to levy taxes for a limited period to pay deficiencies when approved by a body independent of the municipality, such as the state tax commission, and to anticipate such levies by borrowing within the amount to be raised thereby; to be made effective for immediate relief of cities having existing deficiencies.

To amend the constitution as to secure representation of cities upon county budget commissions.

To fix maximum limitations upon levies to be made by tax levying authorities, which shall not be subject to review by the budget commission, each unit to keep within its own limitations and the total to be within an aggregate maximum.

A direct inheritance tax law.

An state income tax law.

An occupational tax.

An occupational tax graduated according to profits earned. Means to secure 100 per cent valuations on all property, especially realty.

A poll tax in addition to property tax.

A payment of part or all of automobile license fees to cities.

Taxation of church property.

Requiring tax returns to state amount of fire insurance carried on personal property returned.

Prosecution of violations of municipal ordinances rather than state laws covering misdemeanors.

Combination of city and county government in counties where city population predominates.

A tax on foreign fire and liability insurance companies, for the benefit of firemen's pension funds.

The committee will become a permanent organization to meet at stated intervals to discuss municipal problems.

Ready Market For Conservancy District Bonds.

Dayton, O.—The National City Company, the Guaranty Trust Company, and Harris, Forbes & Co., all of New York City, have announced the purchase and sale of \$5,000,000 Miami Conservancy District, Ohio, 5½ per cent bonds. The subscription books were closed a short time after the offering was made. The bonds mature from 1927 to 1946. They were offered at prices ranging from 103.56 to 107.481. The total outstanding debt of the district, including the new issue, is now \$30,000,000 against an assessed property valuation of property against which benefits have been appraised of \$1,194,816,600.

New York Governor Appoints Reconstruction Commission.

Albany, N. Y.—Governor Smith, in a special message to the legislature has named a reconstruction committee which will attempt to solve the post-war problems facing the state. The committee comprises thirty-six members, and includes some of the most influential men and women in the state. There are five women members. Abraham L. Elkus, of New York, has been chosen chairman, at the request of governor Smith. In his message the governor outlined the duties and powers of the commission. The members will serve without compensation, but the governor asks the legislature to appropriate \$75,000 for payment of necessary clerical assistance. Among the chief problems put up to the commission by governor Smith are, the immediate examination of the state military training laws; housing conditions of the state, taxation, food problems with a view to increasing the productive and distributive facilities of the state and lowering the cost of foodstuffs; employment; public health and the necessity of speeding up public works to meet unemployment conditions. The governor announced his intention of bringing other reconstruction problems to the attention of the commission as they arise. The commission is empowered to create for its own use advisory bodies and local branches wherever such are found useful. The governor requests all social and civic organizations to place at the disposal of the commission any information or recommendations concerning problems under consideration. The services of any state department or of experts on the faculty of any state university are placed at the disposal of the commission by governor Smith. The commission is asked, as one of its first duties, to examine the laws passed as emergency measures, the appropriations made for the work required by these statutes and the expenditures made under them.

Food of every kind should be made available at decreased prices, the governor contends in commissioning the board to study these problems, "with a view to capitalizing for permanent use the lessons the war has brought home to us and increase the productive and distributive facilities of the state in cooperation with state and local agencies organized for similar purposes." Co-ordination of state resources with federal, municipal, and private resources is most important, the governor urges, in the solution of the employment problem. The public is requested to apprise the commission of unemployment that may come to its attention. The commission also is committed to dealing with any labor crisis which may arise during the period of readjustment. The federal proposal, as embodied in what is known as the "Soldiers' Settlement Act," will be considered by the commission, as will the suggestion of Secretary of Labor Wilson, that necessary public works be speeded up to meet unemployment conditions. In concluding his message the governor said: "More than all I enjoin upon the commission such speed as may be consistent with thoroughness, in order that situations demanding immediate relief be remedied as soon as possible. The commission is directed to utilize all available material in the possession of special agencies or state departments to this end. I shall rely upon the commission for advice and counsel in all of the matters mentioned, and shall hope to receive early reports of progress and recommendations for action." Mr. Elkus served as counsel to the New York State Factory Investigation Commission; ambassador to Turkey, and a member of the State Board of Regents. The other members include Bernard M. Baruch, formerly chairman of the U. S. War Industries Board; Dr. Felix Adler; Charles P. Steinmetz, inventor and electrical expert of the General Electric Co., and for many years alderman of Schenectady; Alfred J. Johnson, formerly city chamberlain of New York City; Dr. Henry Dwight Chapin, well known New York City physician and especially interested in child welfare work; representatives of the State Federation of Labor; V. Everit Macy, chairman of the Shipbuilding Labor Adjustment Board; L. J. Lowell, president of the State Grange; Alfred E. Marling, president of the State Chamber of Commerce; prominent bankers, business and professional men.

All Banks in City Designated as Fund Depositories.

Omaha, Neb.—All the banks in Omaha have been designated 1919 official depositories for city funds by the city council. The operation of "advertising for bids for city funds" was declared at a meeting of council to be a farce. Only one bank responded to the advertisement. This was the Merchants' National bank and it made a bid of 2 per cent, which is the minimum rate established by statute. The city funds will be distributed as heretofore among all the banks at 2 per cent interest. A rate of 3 per cent can be secured on time deposits, commissioner of finance Ure said, but the funds fluctuate so much that it is not practicable to make time deposits. "The state gets 5 per cent on some of its money in some banks out in the state," said Mr. Ure. "And we could get that rate, too, if we wanted to go out in the state with any of our funds. Under the present law we cannot deposit money outside of the county." The city funds go up and down in a wide range. Soon after July 1 they are up in the millions and toward the end of the fiscal year they drop to almost nothing.

STREET CLEANING AND REFUSE DISPOSAL

Charges for Garbage Collection Increased.

Spokane, Wash.—Service prices of the city crematory have been raised by superintendent Arthur Peterson, and have been officially authorized by the city commissioners. A letter from Mr. Peterson to users of the crematory blames the increase on the wage and salary increases and the increased cost of supplies required in crematory work, the expenses of operating the crematory division. The prices for monthly service—where receptacles are placed

in an accessible position—remain the same as at present. Where men are required to carry cans any considerable distance or from basement or from upper floors, an additional charge is made. New contracts based on revised prices will be required where cans are inaccessible. The superintendent suggests that building owners who have loads hauled instruct their engineers or janitors to assist the crematory crews in loading waste materials. By this method only one crematory man would be required and a considerable saving in hauling costs would result. The new rules for the crematory read in part:

"The owner or occupant of each household or business concern, producing waste, is required to provide separate and proper receptacles to hold garbage.

"Put into garbage can all animal and vegetable refuse from the kitchen, rags, waste paper, old shoes, rubbers, floor sweepings and miscellaneous refuse that will burn.

"Put into ash can all ashes, tin cans, glassware, crockery, and all miscellaneous refuse that cannot be burned.

"To have a clean can at all times, it is suggested that edible kitchen wastes be kept separate and fed to chickens and balance of waste be drained, then wrapped in paper before placing in can.

"Send all orders for service and report all service complaints to crematory division, phone Main 7119.

"The prices cover service, when cans are placed in a position on the ground floor of premises, easily accessible to the collector. An extra charge based on the situation is added when cans are placed on any floor above the second.

PRICE SCHEDULE.

One 30-gallon can, collected each week.....	\$1.00
One 15-gallon can, per month.....	1.00
Two 30-gallon cans, per month.....	1.75
One load ashes or rubbish.....	3.00
Three 30-gallon cans, per month.....	2.50
Four 30-gallon cans, per month.....	3.25
Five 30-gallon cans, per month.....	4.00
Six 30-gallon cans, per month.....	4.75
Fifty or more 30-gallon cans, per can.....	.15
(All waste materials collected under miscellaneous service must be placed at curb or easily accessible.)	
Decaying vegetable matter in lots of 1,000 pounds or more, collected from commission houses or order, per 100 pounds.....	.20
One load boxed or baled paper.....	2.50
Less than load paper, rubbish or ashes, per cubic yard.....	1.15

Garbage Handling Profitable.

Indianapolis, Ind.—In a report to mayor Charles W. Jewett the board of sanitary commissioners points out that in the last seven months the total net income from the municipal garbage reduction plant, which was taken over by the commissioners, May 25, 1917, has been \$14,896.99. The report shows that for the last seven months the total operating revenue was \$87,427.23, made up as follows: Grease production, \$63,665.63; garbage tankage, \$19,502.17; hides, \$4,259.43. The operating expenses totaled \$50,327.20 as follows: Plant operating expense, \$36,370.69; collecting department expense, \$7,090.26; purchase of waste meat and grease, \$1,354.94. Deduction of the total operating expense from the total income, the report shows, gives a gross income of \$37,100.03. From this \$17,500 is deducted for the depreciation fund and \$4,703.13 is deducted for interest on bonds, leaving the net income of \$14,896.90. The reduction plant was bought for \$175,000 from the Indianapolis Reduction Company, which had the contract for garbage collection for a number of years. The commissioners say in their report that at the rate of profit for the last seven months the plant will pay for itself in five years and that the net profit represents a return of 8.5 per cent. on the original investment of \$175,000. The commissioners also say that a saving of approximately \$37,000 a year has been effected in the collection of garbage, which is taken care of by the board of public works, as the total cost of collection in the seven months has been \$29,765.81, or at the rate of approximately \$51,000 a year, while the only bid for the collection of garbage was \$87,900. Thus, the commissioners point out, a great saving has been made on collection costs and at the same time a substantial profit is being obtained from the operation of the plant itself. In explanation of the item of expense listed as "collecting department expense, \$7,090.26," Frank C. Lingenfelter, president of the board of sanitary commissioners, said this represented what the sanitary board had paid for feed and care of teams. The major part of the collection cost is in wages, Mr. Lingenfelter said, and that expense is borne by the board of works, the board of works thus far having paid out \$29,765.81 for this work.

LEGAL NOTES

A Summary and Notes of Recent Decisions—
Rulings of Interest to Municipalities

Sewer Assessment—Land Already Drained.

(Ohio) Where plaintiff's lands were adequately provided by street sewer with drainage, he is not liable to assessment for the construction of another sewer which renders no service and is no benefit to the premises.—*City of Cincinnati v. Doerger*, 120 N. E. 304.

City Payment for Railroad Crossing Guards—Police Power.

(Fla.) Where a city receives from a railroad valuable property and other benefits in removal of switching operations, on consideration that city would bear the expense of operating guards at crossing, it is not a contract bartering away its police power.—*Florida East Coast Ry. Co. v. City of Miami*, 79 So. 682.

Undertaking Business in Residence Street—Power of Restriction.

(La.) Municipal authority to prohibit location and maintenance of establishments where any unwholesome business is carried on and to restrict them within certain limits includes authority to prohibit undertaking business on residence street, where not theretofore conducted.—*Osborn v. City of Shreveport*, 79 So. 542.

Without any prohibitive ordinance, an undertaker may be prevented from establishing his business among residences where such business has not theretofore been conducted.—*Id.*

Failure to Complete Contract on Time—Bonding Company Liability—Liens.

(Idaho) A provision, in a bond for performance of a construction contract, that the contractor shall pay all expenses that the village and its engineer may be put to by failure to complete on time, does not create liability for engineering services prior to the breach of the contract.—*Village of Council v. United States Fidelity & Guaranty Co.*, 175 P. 44.

In an action on a bond for performance of a construction contract, where there is sufficient evidence that certain items are lienable, the liens and evidence of payment by the plaintiff are admissible.—*Id.*

In action on bond on construction contract, testimony that certain sums were expended by the obligee in completing the contract in accordance with the plans makes a *prima facie* case against the bonding company.—*Id.*

Mill Constructed Before Town Incorporated—Power to Regulate.

(Or.) Act 1898 (L. O. L. § 3229) conferred upon cities and towns incorporated under its general police power to regulate the use of private property, and a mill constructed without a license before incorporation of town, in what was then a county road, and which is now maintained along and across a street, is no exception.—*Town of Gaston v. Thompson*, 174 P. 717.

The existence of an open millrace in the principal thoroughfare of a town primarily affects the local situation, and is within scope of authority of cities and towns, under Const. art. 11, § 2, empowering the legal voters to enact and amend their charters.—*Id.*

Requiring defendant to keep millrace maintained along a street of plaintiff, to be covered with planks sufficient for ordinary travel, is a reasonable exercise of the police power committed to plaintiff by Statute 1893 (Laws 1893, p. 119), and reasserted in initiative charter (April 14, 1914), and is properly classified as local, special, and municipal legislation, under Const. art. 4, § 1a, reserving initiative power to voters.—*Id.*

Street Depression Filled with Water—Liability for Sickness.

(S. C.) Civ. Code 1912, § 3053, making city liable for bodily injury or damages to person or property through defect in street by reason of mismanagement, does not render city liable to property owner made ill by depression in street filled with stagnant water.—*Triplett v. City of Columbia*, 96 S. E. 675.

Paving Specifications—Separate Rolling of Courses.

(Iowa) Under paving contract specifying three courses of crushed stone of six, four, and two inches, "thoroughly rolled and compact," or "thoroughly rolled" to engineer's satisfaction, contractor had to roll each course thoroughly compact, and not merely to reduce all courses to ten inches after rolling, as shown in blue print measurements.—*Ford v. City of Cedar Rapids*, 168 N. W. 870.

Street Lighting Contract—Lamp Size Reduction.

(Wash.) Under a contract to furnish city street lighting should continue during the contract term, except that its position might be changed at the city's expense, and further that the size of lamps might be changed, but that the company, refusing to reduce the size of lamps as ordered by the city, might recover on the basis of the size of the lamps established.—*Puget Sound International Ry. v. City of Everett*, 175 P. 40.

Pollution of Creek by Gas Company Waste—Prosecution.

(Mo. App.) Where the discharge of waste water by a gas company into a creek constitutes a public nuisance because it destroys the fish and pollutes the water so as to be injurious to public health, the prosecuting attorney may enjoin such nuisance under the statute.—*State ex rel. Wear v. Springfield Gas & Electric Co.*, 204 S. W. 942.

Where a gas company pollutes the waters of a creek by waste so as to destroy the fish therein, the prosecuting attorney may enjoin such pollution, Rev. St. 1909, § 6508, vesting title to the fish in the state, and section 1007 directing prosecuting attorneys to prosecute all actions in which the county or state is concerned.—*Id.*

The authority to prosecute a suit to enjoin pollution of a stream is not exclusive in the prosecuting attorney; Rev. St. 1909, § 970, authorizing the Attorney General to institute such proceedings.—*Id.*

In a suit to enjoin a gas company from polluting a stream, evidence held not to show that defendant was discharging deleterious substances into the stream in such quantities as to destroy the fish.—*Id.*

Waterworks Bond Issue Election—Validity.

(N. M.) Where an election on a bond issue in the main conforms to the requirements of the statute, though wanting in particulars not essential to power to hold election, and is acquiesced in by the people, such irregularities did not render the bonds so issued void.—*City of Albuquerque v. Water Supply Co.*, 174 P. 217.

City council's submission to voters of a proposition to issue bonds to purchase or erect a system of waterworks is not a double proposition, but is to be construed as a proposition to acquire a waterworks system either by purchase or construction.—*Id.*

A notice of a city's election to vote on a bond issue, published once a week for four consecutive weeks, the last insertion being 13 days before election, substantially complies with Code 1915, § 2717.—*Id.*

Mere irregularities in notice will not, of itself, invalidate a city election on the issuance of waterworks bonds, but it must further be shown that a strict compliance with the statute would have made a different result.—*Id.*

Bonds properly signed by city officers at the date of signing the bonds were not rendered invalid because the sale of the bonds were not concluded by such officers but by their successors in office.—*Id.*

Laws 1915, c. 74, requiring approval of state tax commission to proposed increase of municipal tax rate, has no application to levies to provide bonds for payment of the principal and interest on the bonded indebtedness.—*Id.*

NEWS OF THE SOCIETIES

Feb. 25-28, 1919.—AMERICAN ROAD BUILDERS' ASSOCIATION. Sixteenth annual convention and Ninth American Good Roads Congress under the auspices of the A. R. B. A., Hotel McAlpin, New York, N. Y. Secretary, E. L. Powers, 150 Nassau street, New York, N. Y.

Nov. 12-14, 1919.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

American Road Builders' Association.

The ninth American Good Roads Congress and the sixteenth annual convention of the American Road Builders' Association will be held at the Hotel McAlpin, Broadway and 34th street, New York City, February 25, 26, 27 and 28, 1919.

It is proposed to bring together those most prominently identified with highway construction, transportation and maintenance for the purpose of considering the questions of the hour.

The program which is now being prepared for the eight sessions of the congress will be devoted to the consideration of highway transportation and the administration, financing, construction and maintenance of national, state, county and municipal highways. Papers by prominent highway authorities and reports on live topics by several committees will be presented for discussion. The general plan contemplates devoting February 25 and 26 to the presentation and discussion of papers, and February 27 and 28 for the consideration of reports to be submitted by several committees. The business session of the association will be held on the afternoon of February 28, and the annual banquet on the evening of the 26th or 27th. It is proposed to show motion pictures pertaining to highways on two evenings during the congress.

Among the subjects which will be presented for discussion are the following:

National Highways and Federal Aid for State Highway Improvements.

Relation of Highways to Railways and Waterways.

Efficient Methods of Contracting for Highway Work During the Reconstruction Period.

Efficient Methods of Promoting Highway Bond Issues.

Efficient Methods of Drainage for Different Geological Conditions.

Foundations for Heavy Horse-Drawn and Motor-Truck Traffic.

Methods of Maintaining Highway Systems Prior to Construction by the State or County.

Economic Utilization of Labor-Saving Machinery.

Cost Keeping for Highway Contractors.

Street Systems, Their Relation to Highways Outside of Urban Districts.

The Efficiency of the French Broken Stone Roads During the War.

Efficiency of Bituminous Surfaces Under Motor-Truck Traffic.

Recent Developments in the Construction, Maintenance and Reconstruction of Cement-Concrete Pavements.

Present Status of Brick Pavements Constructed With Sand Cushions, Cement Mortar Beds and Green Concrete Foundations.

Recent Practice in the Construction of Stone Block Pavements.

Committees will submit reports on the following topics:

Regulations Covering Speed, Weight and Dimensions of Motor Trucks.

Methods of Financing Highway Improvements for States, Counties and Towns.

Civil Service Requirements for Highway Engineering Positions.

Sources of Supply of Unskilled Labor for Highway Work.

Convict Labor on Highway Work: Organization, Administration, Camps and Cost Data.

Reconstruction of Narrow Roadways of Trunk Highways With Adequate Foundations and Widths for Motor-Truck Traffic.

Methods of Strengthening and Reconstructing Highway Bridges for Heavy Motor-Truck Traffic.

Efficient Methods of Snow Removal

from Highways Outside of Urban Districts.

Guarantees for Pavements on Roads and Streets.

Uniform Highway Signs.

Next year it is proposed to hold, in connection with the convention, the most complete and comprehensive exhibit of road machinery, equipment and materials ever seen. At the time, however, it was decided to hold this year's convention in New York City, the war was still in progress, and it was felt to be out of the question to have an exhibition on anything approaching a large scale. It was therefore decided to limit this feature to the facilities afforded in the Winter Garden, on the top floor of the Hotel McAlpin.

The sessions of the convention will be held in the ballroom, which is also located on the top floor and adjoins the Winter Garden.

New England Water-Works Association.

At the annual meeting of the New England Water-Works Association, held in Boston January 8, Carleton E. Davis, retiring president, in his address, urged more recognition of both the younger and the associate members. Mr. Davis touched on services rendered by water-works during

(Continued on page 100)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Preliminary plans have been prepared for a PARK and PLAY GROUND, including a small concrete bridge, by the city of Lorain, O. The consulting architect is M. J. Horvath.

Belfield, N. D., is to build a WATERWORKS SYSTEM, including reinforced concrete reservoir, pump house, etc. The consulting engineer is L. P. Wolff.

A WATERWORKS DISTRIBUTION SYSTEM is being planned by the city of East Alton, Ill. The plans are being prepared by the architects, Shepard & Morgan.

A highway and trolley BRIDGE is to be built over the Housatonic river between Stratford and Milford, Conn., by the State of Connecticut. The consulting engineering firm is Waddell & Son.

A MUNICIPAL PIER which will include ferry boat landing and pavilion is to be built by the city of Wyandotte, Mich., according to plans being prepared by the consulting engineers, Mason L. Brown & Son.

Preliminary plans have been prepared for a DRAINAGE SYSTEM, consisting of ditch and levy work, by the Ray county drainage district, Hardin, Mo. The consulting engineers are the C. E. Jacoby Engineering Co.

PAVING IMPROVEMENTS are to be made by Monroe, Wis., involving approximately twenty-six blocks. The consulting engineer is John F. Icke.

Woodlawn, Pa., is to build a SEWAGE DISPOSAL PLANT according to plans prepared by the consulting engineer, R. Winthrop Pratt.

WATERWORKS IMPROVEMENTS are planned by Lockport, N. Y. The consulting engineers are the firm of Hill & Ferguson.

A WATER DISTRIBUTION SYSTEM is to be built by the town of Princess Ann, Md., according to plans prepared by the consulting engineer, L. J. Houston.

A WATER SYSTEM, including reservoir, pumping station and filter plant, is contemplated by the city of Gillespie, Ill., according to plans prepared by the consulting engineering firm of Miller, Holbrook & Warren.

WATERWORKS IMPROVEMENTS are to be made by the city of Prescott, Ariz., involving the reconstruction of the distribution system and building of new water system, to include storage reservoir, distributing reservoir, canal, headgate and supply pipe line. The estimated cost is about \$300,000. The consulting engineer is H. Phillips.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

RESPIRATORS AND MASKS.

For Protection Against Dust, Smoke, Fumes, etc.

The increasing attention paid by municipal departments and public utility companies to the safety of employees is being extended to protection from the hazards due to dust, smoke, poisonous gases, acid fumes and similar harmful agents. Fire departments, street cleaning departments, garbage plants, emergency stations, gas companies, etc., find important uses for respirators and masks for such protection.

The Diamond standard respirator is made of white rubber, moulded in one piece in a shape to fit the face of the wearer without interfering with the vision or with the wearing of eye protectors. A fine filtering sponge and gauze filter in front is provided for extracting the most minute impurities from the air. The standard respirator is also equipped with an aluminum protected outlet valve to allow easy and natural breathing. An elastic headband is provided for quick adjustment.

The respirator may be cleaned by holding it under the faucet.

The Diamond aluminum respirator is the same in principle and design as the standard device, but the body is made of aluminum. It is equipped with a pneumatic rubber cushion and release valve. This respirator is intended for heavy duty and service conditions.

The aluminum respirator forms the respirator part of the Diamond respirator mask—a combination of mask and respirator. The body of the mask is made of brass, nickel-plated. The eye-pieces are carefully ground. A pneumatic face cushion with outlet valve is designed for comfortable, gas-tight contact between face and mask. This mask is now in use in the street cleaning department of San Antonio, Tex.

The "Dustite" respirator is made of white rubber, with aluminum ring for holding the gauze filter. All parts are separately renewable. It is fitted with detachable straps and is so made as to allow quick removal and replacing of filter. The filter is made of special material. This respirator has been

tested and approved by the Underwriters' Laboratories.

This line of respirators, examples of which are shown in the accompanying illustrations, is made by the Safety First Supply Company.

INDUSTRIAL NEWS

Drop in Cast-Iron Pipe Prices.

Following the reductions in pig-iron prices the prices for cast-iron pipe have also been revised downward. The reduction is \$5 per ton in Chicago and the Central-West, and now also in the East. The market, owing to limited buying of municipalities, has not been tested. These prices are therefore not regarded as bottom, and will be tested as soon as business of any importance develops. While manufacturers state that prices will be regulated by that of pig iron, buyers point out that the price of scrap should also be considered. Quotations: New York, 6-inch and heavier, \$62.70; 4-inch, \$65.70; \$1 additional for Class A; Chicago, 6-inch and heavier, \$61.80; 4-inch, \$64.80.

"Chlorine Control Apparatus."

This is the title of a new catalog issued for general distribution by Wallace & Tiernan Co., Inc., 349 Broadway, New York, N. Y. The development of chlorination is described and its advantages enumerated. The principles and methods of chlorine treatment of water and sewage are explained with charts and diagrams. The illustrations show installations of the Wallace & Tiernan equipment and diagrams of the various types of apparatus.

Lime Association Postpones Meeting.

The annual meeting of the Lime Association, which was to have been held February 12 and 13 in Pittsburgh, has been indefinitely postponed.

The executive committee of the association, at its meeting in Washington, felt that an annual meeting so soon after the organization of the association would be premature, and unanimously agreed that the annual meeting ought to be held in June because of the labor and expense of such a meeting.

The Lime Association has been in operation less than seven months. During four and one-half months of that time its activities along promotional lines were discouraged by the War Industries Board, and practically all of the work done by the association during that period was in behalf of the War Service Committee and in securing priorities and preferences for



"Dustite" Respirator.



Respirator Mask.



Standard Respirator.



Aluminum Respirator.

RESPIRATORS AND MASKS.

members. The programs planned in each of the three bureaus of the association since restrictions on promotional work were removed by the War Industries Board are now actively under way. These three programs look directly toward the immediate increase of lime tonnage.

The executive committee has adopted as a watchword "Economy and Tonnage" at this time, and wishes the members of the association to know that it was in the interests of these two necessary considerations that it has recommended to the directors, who have ratified the action, that the annual meeting be postponed.

Kentucky Crushed Stone Association.—At a meeting of the leading stone crushers of Kentucky at the Seelbach Hotel, Louisville, the Kentucky Crushed Stone Association was recently organized. The organization is composed of quarry operators who operate crushing plants for furnishing crushed stone for building, railroad, highway and other construction, and any crusher operator is eligible to membership.

The plans of the association are to unite the trade on a firmer basis. It is planned to bring about greater co-operation and better maintenance of markets, better methods of quarrying, interchange of information concerning machinery and quarrying in general, and in such matters as freight rates, deliveries, coal supply, general supplies, labor and selling terms.

NEWS OF THE SOCIETIES

(Continued from page 98)

the war and the opportunities for still further service during the reconstruction period.

The election of officers resulted as follows: President, Samuel E. Killam, superintendent of pipe lines and reservoirs, Metropolitan Water-Works, Boston; secretary, Willard Kent, Narragansett Pier, R. I.; editor, Henry A. Symonds, consulting engineer, 70 Kilby street, Boston; treasurer, L. M. Bancroft, Reading, Mass. All but the president were re-elected.

Oklahoma Utilities Association.

The Oklahoma Utilities Association will hold its annual convention in Oklahoma City, Okla., February 6, 7 and 8. Many interesting features have been arranged for the occasion.

One of these will be an exhibition of articles and apparatus of interest to utilities by the various manufacturers. A limited amount of space will be available for exhibition purposes, for which no charge will be made. Manufacturers of such apparatus who desire to be represented at the convention may reserve suitable space by communicating with J. O. Kammennan, Oklahoma Utilities Association, State National Bank Building, Oklahoma City.

PERSONALS

Rodgers, Hugh, has been appointed city engineer of Salem, Ore.

Gillespie, Richard H., formerly chief engineer of the Borough of the Bronx, New York City, has been appointed chief engineer and general manager of the Dewey Cement-Gun Construction Company, with headquarters at Allentown, Pa.

Atwood, B. M., has resigned as state engineer of Arizona, and will probably enter the contracting business, specializing in highway construction.

Butler, Captain A. D., Corps of Engineers, U. S. A., returned recently to his duties as city engineer of Spokane, Wash.

Dodd, J. S., assistant road engineer of the Iowa highway commission, who has been taking the place of Major F. R. Agg as professor of highway engineering, Iowa State College, during the absence of the latter in the army, has resigned and has returned to his duties with the commission. Major Agg has reassumed his teaching duties as professor of highway engineering.

The following appointments have been made by Mayor Mount, of Burlington, N. J.: city clerk, Walter W. Marrs; street commissioner, James McFadden; superintendent of the alarm, Elmer Gares; water commissioner, Selden Prokasco.

BOOK REVIEW

AMERICAN HIGHWAY ENGINEERS' HANDBOOK. By Arthur H. Blanchard, editor-in-chief, and seventeen associate editors. 1658 + XXV pages. John Wiley & Son. \$5.00 net.

This "handbook" is in fact an encyclopedia of highway engineering, published in handbook size (4½ by 7) and with flexible binding. The reliability of the information given and of the opinions expressed is guaranteed by the character of the authors. Prof. Blanchard, in addition to acting as editor in chief, has written chapters on "Terminology of Highway Engineering," "Bituminous Surfaces," "Bituminous Macadam Pavements," and "Bituminous Concrete Pavements." Harold S. Boardman, dean of the College of Technology, University of Maine, wrote the chapters on "Mathematics, Mechanics and Structural Materials" and "Highway Bridges, Culverts, Retaining Walls, Foundations and Guard Rails." James F. Kemp, Professor of Geology, Columbia University, and Frederick K. Morris, instructor in the same department, wrote the chapter on "Engineering Geology." W. W. Crosby, formerly chief engineer Maryland State Roads Commission, prepared the chapters on "Preliminary Investigation," "Brick Pavements" and "Cement-Concrete Pavements." Henry B. Drowne, formerly instructor in Highway Engineering at Columbia

University, prepared the chapters on "Surveys and Office Practice" and "Planning of Roads and Road Systems." Nelson P. Lewis, chief engineer of the Board of Estimate and Apportionment, New York City, was author of the chapters on "Planning of Streets and Street Systems" and "Financing of Highway Improvements." Austin B. Fletcher, engineer of the California Highway Commission, prepared the chapter on "Grading, Drainage and Foundations." Joseph Hyde Pratt, secretary North Carolina State Highway Commission, wrote the chapter on "Earth and Sand-Clay Roads." Charles J. Bennett, state highway commissioner of Connecticut, the chapter on "Gravel Roads." Arthur W. Dean, chief engineer of the Massachusetts Highway Commission, the chapter on "Broken Stone Roads." Prevost Hubbard, chemical engineer U. S. Office of Public Roads and Rural Engineering, the chapter on "Bituminous Materials." John R. Rablin, engineer of Metropolitan Park Commission of Massachusetts, "Dust Prevention by the Use of Falliatives." Francis P. Smith, consulting chemical and paving engineer, "Sheet Asphalt and Rock Asphalt Pavements." George W. Tillson, formerly consulting engineer to Borough President, Brooklyn, N. Y., "Wood Block Pavements," "Stone Block Pavements," "Car Tracks and Pipe Systems," and "Comparison of Roads and Pavements." William H. Connell, formerly chief of Bureau of Highways and Street Cleaning, Philadelphia, "Street Cleaning, Collection and Disposal of Waste, Snow Removal" and "Organization and Administration of Highway Departments." Mark Brooke, Colonel of Engineers, U. S. A., "Sidewalks, Curbs, Gutters and Highway Signs." Henry A. Gardner, assistant director, Institute of Industrial Research, "Preservation of Materials Used in Highway Structures."

The above enumeration of chapter titles gives an idea of the exhaustive character of this book. Every phase of the planning, construction and use of both country roads and city streets seems to be covered. In fact, it seems to us that the book could have been shortened slightly by omitting a few subjects, such as garbage disposal, without detracting from its value to the highway engineer. But such not strictly pertinent matters occupy comparatively few pages.

The 78 pages of Index is unusually well arranged. The book contains a great number of tables and diagrams, but is notable by the absence of half-tones—a commendable economy of space that is unusual in modern books. The diagrams and other line drawings number 607, and there are 369 tables.

This book is by far the most comprehensive collection of principles and facts concerning highways and streets that has ever appeared in any form, so far as we know, and will be of great value to every engineer whose work lies in this field.

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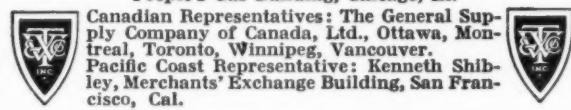
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age railroads were unknown while G

...ne c
...no program is fixed, I believe the A
ay as long as we want them. In my opinion that
a very long time."

UNUSUAL RECORDS OF LIFE OF CAST IRON PIPE

Some service records on cast iron pipe used in railway water supply lines were recently developed which will be of value to those concerned with water service installation. These data should also afford an opportunity for interesting comparisons with the basis used by the Federal valuation forces in estimating the depreciation on this material. The long life of cast iron pipe is a matter of rather general knowledge. There are records of pipe in use in Europe for over 200 years. In this country, and particularly on

ds, such long time service records are not to be had
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the use of cast iron pipe in conse-
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on pipe lines over 50 years old

Several instances of some study on the Illinois
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to the present time. The
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it is now

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